FLORENCE COPPER

FLORENCE COPPER INC.
1575 W. Hunt Highway, Florence, Arizona 85132 USA
florencecopper.com

February 27, 2020

Mr. David Albright
Manager, Drinking Water Protection Section
U.S. Environmental Protection Agency, Region 9
Drinking Water Protection Services, WTR-3-2
75 Hawthorne Street
San Francisco, California 941055

Re: Request to Revise Bulk Electrical Conductivity Alert Levels Associated with UIC Permit No. R9UIC-AZ3-FY11-1, Florence Copper Project, Florence Arizona

Dear Mr. Albright:

Pursuant to a verbal request received by telephone from Ms. Nancy Rumrill, Florence Copper Inc. (Florence Copper) herewith transmits a request to revise the alert levels (AL) for bulk electrical conductivity (bulk EC) associated with Underground Injection Control (UIC) Permit No. R9UIC-AZ3-FY11-1.

Background

Florence Copper operates the Production Test Facility (PTF) wellfield for the purpose of demonstrating the feasibility of In-Situ Copper Recovery (ISCR) methods to recover copper from the Poston Butte copper deposit in Florence, Arizona. The PTF is authorized by Temporary Aquifer Protection Permit (APP) No. P-106360 and UIC Permit No. R9UIC-AZ3-FY11-1. Section 2.2.4 of the APP requires that Florence Copper measure bulk EC to confirm hydraulic control. Section F.6.b of the UIC Permit requires that Florence Copper monitor bulk EC. Section 2.5.9 of the APP sets forth the requirements for establishing ambient bulk EC values, and for calculating an appropriate bulk EC AL. The bulk EC AL values are not stated in the UIC Permit. Section 2.6.2.7 of the APP sets forth requirements associated with a confirmed exceedance of the bulk EC AL.

In accordance with requirements of the APP, Florence Copper has been collecting bulk EC data weekly, and comparing those data to the ALs established based on ambient bulk EC monitoring conducted prior to the start of PTF operations. The bulk EC compliance monitoring system includes three bulk EC sensors, installed on each of the seven observation wells (identified as O-01 through O-07) at the edge of the PTF wellfield, resulting in a total of 21 compliance monitoring sensors.

The bulk EC AL values are a lower limit, measured in terms of resistivity (units of ohm-meter [Ω m]), consequently, a bulk EC value that declines below the AL is characterized as an exceedance. Because the injected fluid has significantly higher conductivity than native groundwater, a vertical excursion of injected fluid will result in a localized decrease in bulk EC detected at multiple sensor pairs. Florence

Copper submitted a proposal to ADEQ in August 2018, that included a description of the method for establishing the bulk EC ALs and included discussion of method sensitivity and factors that may affect bulk EC values.

Observed Bulk EC Exceedances and Causes

Beginning on November 21, 2019, Florence Copper confirmed exceedances of the bulk EC AL on three monitoring horizons at three PTF observation wells. In accordance with Section 2.6.2.7(4) of the APP, Florence Copper submitted a Technical Memorandum on January 10, 2020, 30 days after the exceedances were confirmed that described the cause, impact, mitigation of the exceedances, and described any errors in measurement, data analysis, and statistical evaluation of the bulk EC data. The Technical Memorandum is enclosed with this letter. The occurrence and magnitude of the observed exceedances are described in the enclosed Technical Memorandum.

The 30-day Technical Memorandum found that the bulk EC AL exceedances detected on November 21, 2019, and confirmed November 26 through December 5, 2019, are the result of natural changes in ambient environmental conditions at the PTF wellfield. The confirmed bulk EC exceedances were caused by the cumulative effects of precipitation events occurring prior to November 21, 2019 which resulted in an increase of ambient soil moisture, decreased soil temperature, and resulted in other environmental changes affecting the surficial components of the bulk EC monitoring network, associated grounding network, and reference electrodes. A detailed description of the data and information describing the cause of the bulk EC exceedances is described in the enclosed Technical Memorandum.

The exceedances are not the result of measurement error, data analysis error, or error in statistical analyses. The confirmed bulk EC exceedances are not the result of vertical excursion of injected fluid, no impacts to the environment are known to exist as a result of the bulk EC exceedances, and no environmental mitigation is required.

Amendment of APP No. P-106360 to Revise Bulk EC ALs

Following submittal of the 30-day Technical Memorandum, Florence Copper prepared and submitted an application to amend APP No. P-106360 to revise the bulk EC AL values to reflect the observed variability in natural conditions at the PTF wellfield. The revised bulk EC AL values were calculated using the same statistical method used to develop the initial AL values, using the full range of observed values. The original and revised bulk EC AL values are summarized below in Table 1.

Table 1. Summary of Observed Bulk EC Exceedances and Confirmation Values

Horizon*	Original Bulk EC AL (Ω-m)	ADEQ Approved Revised Bulk EC AL (Ω-m)
Horizon 1	9.93	9.67
Horizon 2	10.12	9.89
Horizon 3	10.33	10.07

Notes:
* Horizon 3 is the deepest compliance monitoring horizon and is located at the bedrock lower basin fill unit contact and is the closest to the injection zone. Horizon 1 is the shallowest monitoring horizon and is furthest from the injection zone.
Ω-m = ohm-meter; ADEQ = Arizona Department of Environmental Quality;
AL = alert level; EC = electrical conductivity

The APP application was submitted on January 17, 2020, and the amended APP was issued on February 13, 2020 with revised bulk EC AL values. Both the APP amendment application and the amended APP are enclosed.

Request to Revise Bulk EC ALs Associated with UIC Permit No. R9UIC-AZ3-FY11-1

Florence Copper hereby requests that the U.S. Environmental Protection Agency adopt the revised bulk EC AL values included in the amended APP No. P-106360 issued by the Arizona Department of Environmental Quality on February 13, 2020 for use in conjunction with UIC Permit No. R9UIC-AZ3-FY11-1.

Please contact me at 520-316-3710 if you require any additional information.

Sincerely,
Florence Copper Inc.

Richard Tremblay
Vice President Operations

cc: Maribeth Greenslade, Arizona Department of Environmental Quality
Nancy Rumrill, U.S. Environmental Protection Agency, Region 9

Enclosures

References:

Brown and Caldwell, 1996. Magma Florence In-Situ Project Aquifer Protection Permit Application, Volume IV of V, Modeling Report. January.

Golder Associates, 1995. Data Report for Initial Interpretation of the Hydraulic Tests at the Florence Mine Site for Magma Copper Company Aquifer Protection Permit Florence In-Situ Leaching Project.